

Dens fracture in a patient with extensive craniocervical bone pneumatization

Craniocervical bone pneumatization in humans is very rare: only a handful of cases have been reported, predominantly in males (1). The characteristic air-filled bones are prone to fracture, even following minor trauma.

Our case report (2) recently published in the December 2011 issue of *Diagnostic and Interventional Radiology* described abnormal extensive craniocervical bone pneumatization in a 47-year-old man; the same patient again presented to our hospital 10 months later with cervical pain after minor trauma (collapse). The patient complained of neck pain. No evidence of a neurological deficit was found. Initially performed plain radiographs of the upper cervical spine showed no evidence of a fracture. Because clinical symptoms persisted, we performed multislice computed tomography (MSCT) of the skull base and upper cervical spine using a 64-detector-row computed tomography (CT) scanner (Siemens Sensation 64, Siemens AG Sector

Healthcare, Erlangen, Germany). Axial, coronal, and sagittal reconstructions were made using 0.75-mm slices. In addition to pre-existing extensive pneumatization of the skull base and atlas (Fig. a), submillimeter-scale axial images showed two thin lines at the dens at 7 and 9 o'clock (Fig. b), suspicious for thin fractures. In contrast to the previous CT findings (Fig. a), ambient soft-tissue emphysema could be observed on axial reconstructions (Fig. b, arrow). Although pre-trauma coronal reconstructions (Fig. c) showed pneumatization of the right hemicorpus of the axis, post-trauma MSCT depicted an Anderson and D'Alonzo Type III dens fracture (3) extending through the vertebral body of the axis (Fig. d, arrows).

Patients who have been diagnosed with extensive craniocervical bone pneumatization need to be aware of the fragility of that anatomic region, and treating physicians should consider that even minor head or neck trauma may have serious consequences, such as fractures of the craniocervical region, in these patients. As reported earlier, the complex anatomy of the craniocervical region aggravates

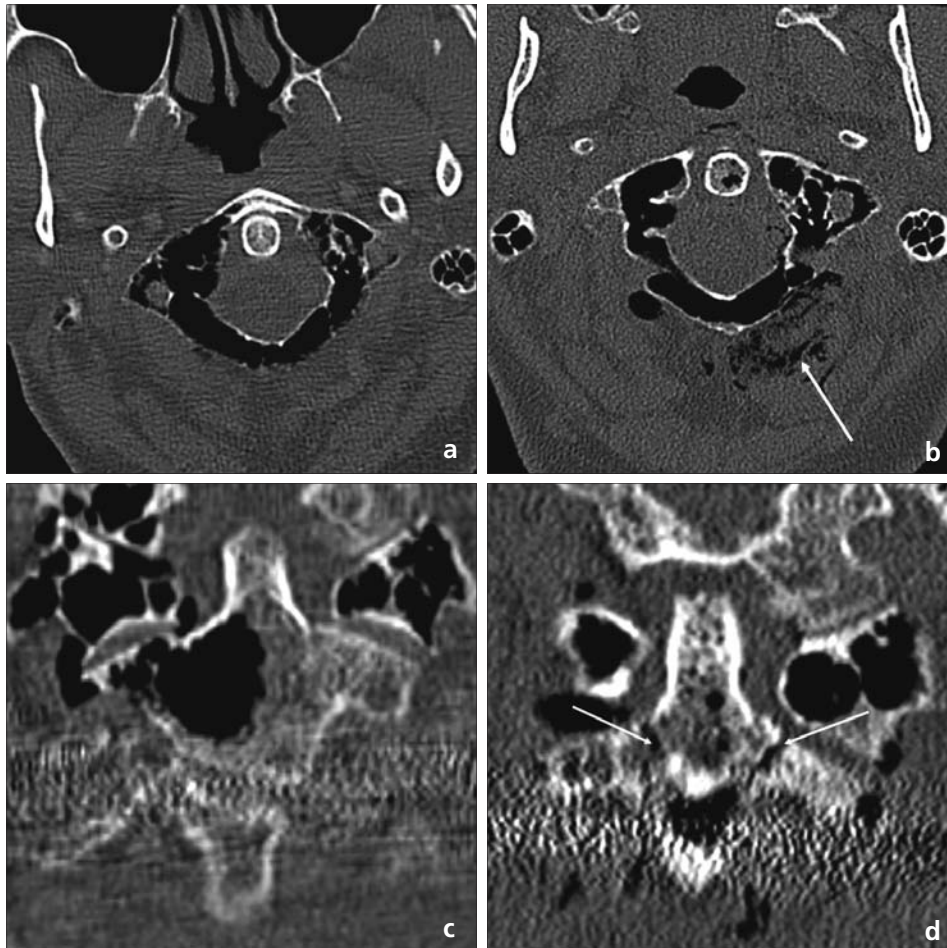


Figure. a–d. Pre-trauma axial 64-detector-row CT image of the cervical spine (a) shows extensive pneumatization of the atlas. Post-trauma image in the axial plane (b) shows ambient soft-tissue emphysema (arrow) as well as thin fractures at the dens at 7 and 9 o'clock. Pre-trauma coronal reconstruction (c) shows pneumatization of the right hemicorpus of the axis, whereas post-trauma coronal reconstruction demonstrates a new Anderson and D'Alonzo Type III dens fracture (d, arrows).

interpretation of plain radiographs of this part of the spine (4), even in vertebrae with a regular bone matrix.

In conclusion, patients with extensive craniocervical bone pneumatization need to be informed of the bone structure instability and the risk of fractures, even following minor trauma. Treating physicians should consider CT as the imaging modality of choice following minor trauma in those patients.

Bernhard Petritsch, Dietbert Hahn, Frank Wendel, Jan Peter Goltz

From the Department of Radiology (B.P. ✉ petritsch@roentgen.uni-wuerzburg.de), University of Würzburg, Würzburg, Germany.

Received 23 February 2012; revision requested 23 February 2012; revision received 29 March 2012; accepted 30 March 2012.

Published online 16 July 2012
DOI 10.4261/1305-3825.DIR.5750-12.2

Conflict of interest disclosure

The authors declared no conflicts of interest.

References

1. Sadler DJ, Doyle GJ, Hall K, Crawford PJ. Craniocervical bone pneumatization. *Neuroradiology* 1996; 38:330–332.
2. Petritsch B, Goltz JP, Hahn D, Wendel F. Extensive craniocervical bone pneumatization. *Diagn Interv Radiol* 2011; 17:308–310.
3. Anderson LD, D'Alonzo RT. Fractures of the odontoid process of the axis. *J Bone Joint Surg Am* 1974; 56:1663–1674.
4. Kontautas E, Ambrozaitis KV, Spakauskas B, Smilys A. Upper cervical spine injuries and their diagnostic features. *Medicina (Kaunas)* 2005; 41:802–809.